forest research note

1982 No. 30

Fig. 1 Safety stops inserted between sections. Tower in position for collecting cones or fruit.

Cone Collection Tower

by

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In 1965 a mature 15-m tall stand of black spruce (*Picea mariana* (Mill) B.S.P.) was selected by Kimberly Clark of Canada Ltd. foresters on the eastern shore of Lydia Lake adjacent to highway 11 in the Geraldton Forest District to supply the seed required for the company's planting program. Because of the long slender black spruce tops, climbing techniques were considered inefficient and difficult to implement. A mechanical device appeared the only feasible means of access to the upper crowns for collection of cones. A portable tower (Fig. 1), was designed and developed in the former Forest Research Branch.

Though the tower is available for operational use, few field foresters are aware of the equipment and its potential applicability for access to crowns of standing trees.

Description

The tower is composed of 3 telescoping 6-m long sections mounted on a trailer. In operating position it reaches a total height of approximately 18 m and provides access to 20 m at collector's arm length.

In travelling position (Fig. 2), the tower is supported on a framework mounted on a trailer. Overall length is approximately 8 m consisting of retracted tower

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Fig. 2 Tower in transport position.

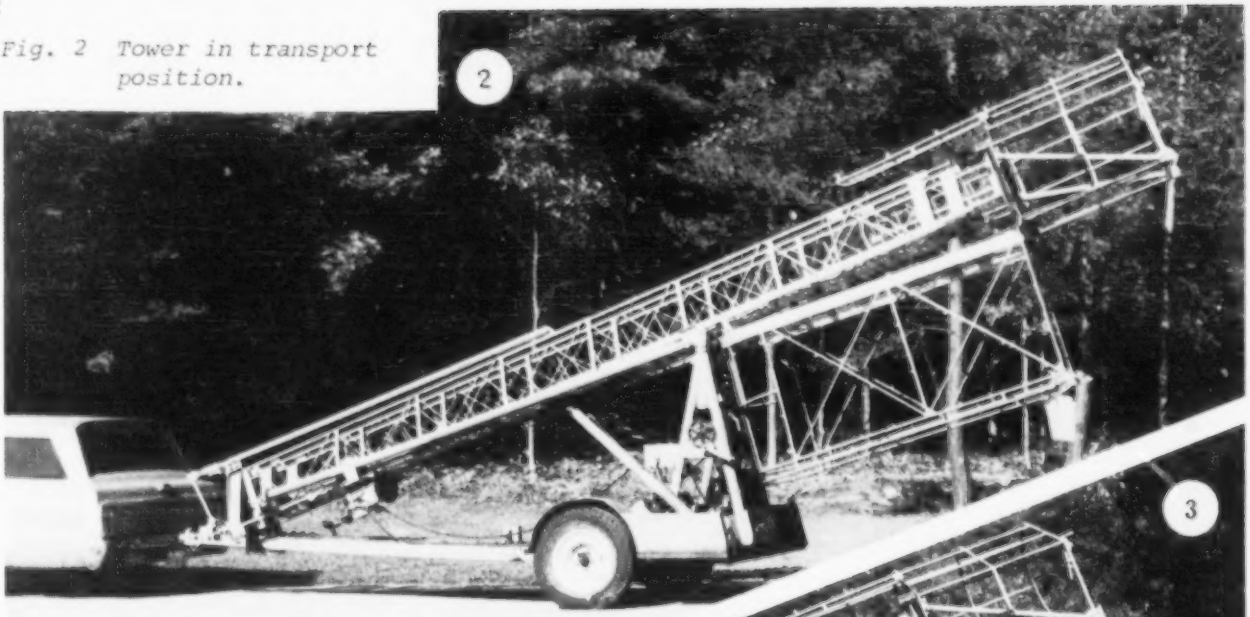

Fig. 3 Stabilizer arms in place and platform locked into position.

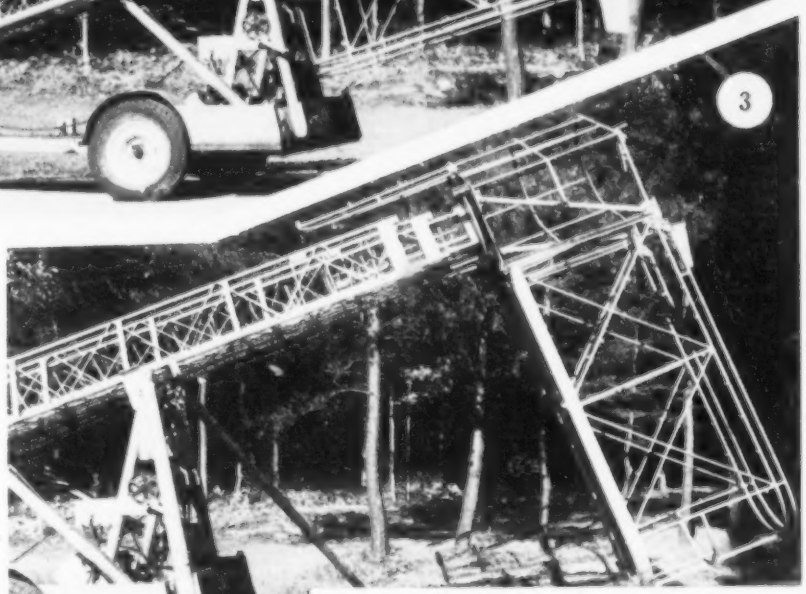

Fig. 4 Control panel for lifting tower.

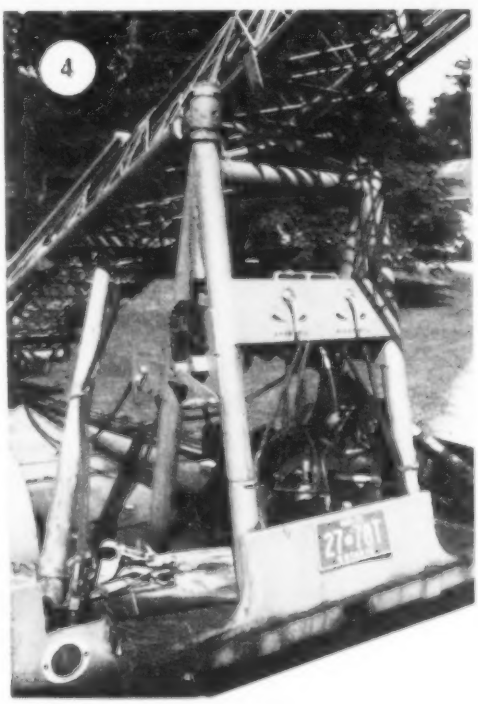

Fig. 5 Operator winding winch to pull base of tower into vertical position.

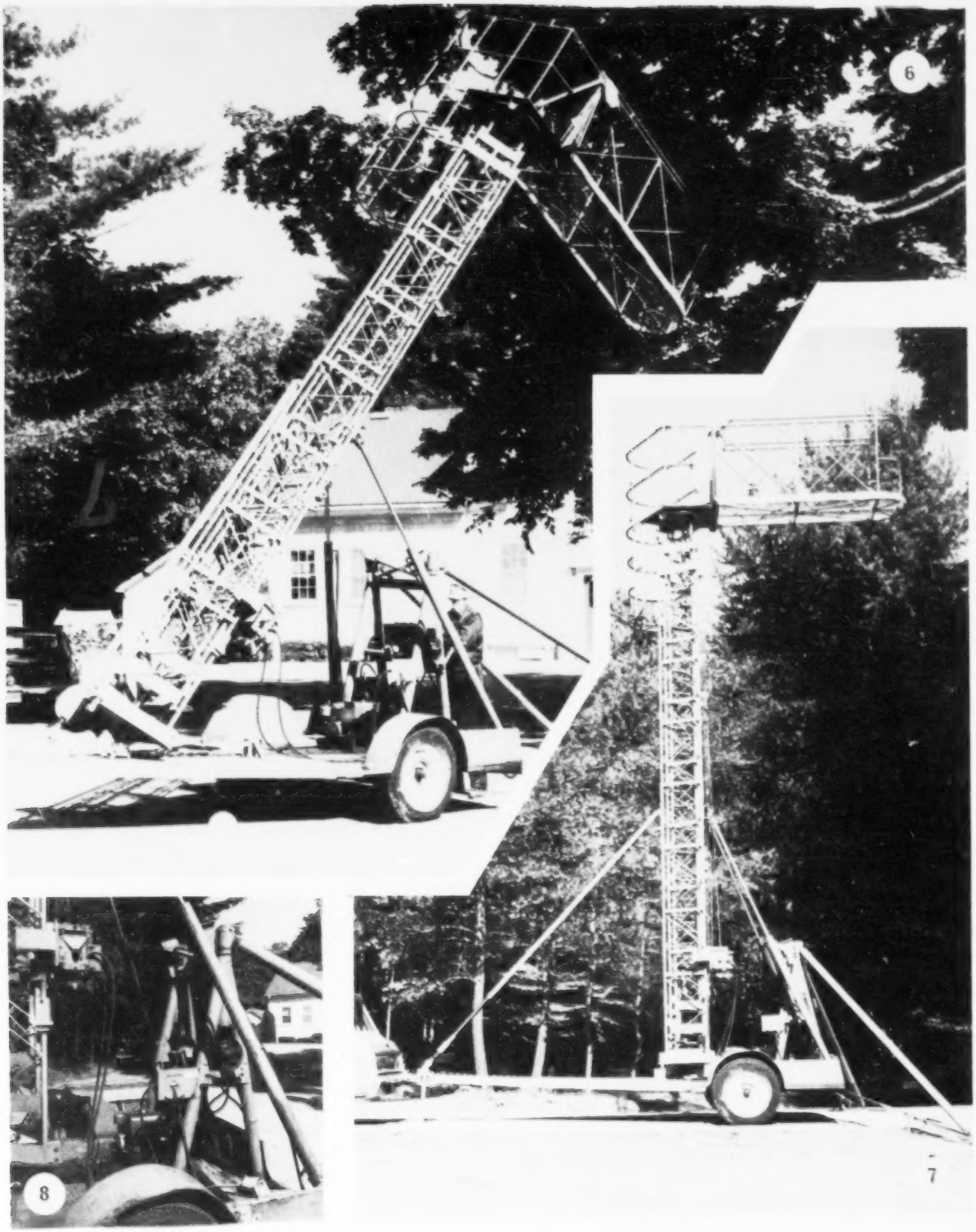

Fig. 6 *Operator raising tower into vertical position.*

Fig. 7 *Tower raised and locked into vertical position before extending second and third sections.*

Fig. 8 *Height control panel operates engine that powers the hydraulic system for operation of cables to raise and lower tower.*

sections and the platform support. The platform, hinged to its support, is fastened below the tower for transport. The trailer rides on a standard half-ton axle, easily drawn by any standard highway vehicle, and has clearance on bush roads comparable to that of a half-ton truck.

Operation

To erect the tower the trailer is moved into a suitable position relative to crown(s) from which collections are to be made. Stabilizer arms are swung out to brace the tower relative to the terrain. The adjustable stabilizers are pinned to ensure a rigid brace. The platform is released from its travelling position and is fastened at right angles to the tower (Fig. 3).

The tower is raised vertically off its trailer supports, through manipulation of two hydraulic cylinders (Figs. 4-6). As it is being raised, a hand crank is used to pull the base of the tower along a track until it can be pinned securely at the rear of the trailer. A forward stabilizer attached to the tower is extended and fastened to the front of the trailer. A screw brace provides a proper adjustment to ensure a rigid tripod support in conjunction with the lateral stabilizers.

When the tower is fixed in a vertical position (Fig. 7), a five horsepower gasoline motor is used to provide power for operating a hydraulic pump. This in turn provides pressure for operating an hydraulic motor acting on cables to raise or lower the telescoping sections of the tower (Fig. 8).

With the platform at the desired height, collectors insert safety stops between the first and second sections and between the second and third sections as they climb to the platform (Fig. 1). An additional safety feature is a valve at the base of the hydraulic levelling cylinders to prevent any retraction resulting from loss of pressure should the lines by damaged.

The 2-m long platform allows two collectors to work comfortably. It is maneuvered manually through 360° from the platform for collection from two or more adjacent tree tops or from both sides of large crowns. The height of the platform is controlled from the base of the tower when the platform is not occupied. Experienced operators can lower and reposition the tower in about 30 minutes.

Application

The use of the tower is limited to accessible and relatively level forest areas with sufficient space for maneuvering the trailer and raising the tower. It has potential application with tall, difficult to climb species with fruit or cones at the top of the crown, or those such as *Larix* spp. with numerous small fruit on the outside of the crown. The principle criterion is time efficiency, where set up time, relative to picking time can be minimized.

Though the tower was designed primarily for seed collection, it has potential application in any field where measurements, collection of foliage, observations or photography are required at or above crown levels. It has had considerable use in fire behaviour studies conducted by Canadian Forestry Service scientists from the Great Lakes Forest Research Centre.

The tower has been used successfully for collection of red pine (*Pinus resinosa* Ait.) cones in Huronia and North Bay District seed production areas. It was tested in the Lydia Lake black spruce seed production area prior to completion of the modified equipment described here.

Acknowledgements

The tower was a concept of A.J. Carmichael in collaboration with Kimberly Clark staff. It was designed by V. McMullen and built by L. Gilbert, H. Foote and C. Hopkinson of the former Forest Research Branch. Photography by B. Colville and J. Robinson.